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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/602,266

06/23/2003

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EXAMINER

PADGETT, MARIANNE L

ART UNIT

PAPER NUMBER

1762

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/01/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/602,266

Applicant(s)

MORIGUCHI ET AL.

Examiner

Marianne L. Padgett

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21, 23 and 25-44 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21, 23, 25-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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1. Applicant's term of disclaimer of 11/24/2006 has removed all the obviousness double patenting rejections of sections 10-18, except for the rejection over claim 1 with respect to PN 6,818,484 B2 in section 10, however independent claim 1 has been amended, such that it differentiates between claims 1+7 of the patent by requiring use of orthogonal directions somehow in the pulse sequence, which requires a variation on the obviousness previously applied. Given applicant's thoroughness in providing the term disclaimer, plus discussion on pages 20-21 concerning the travel disclaimer in the remarks of the 11/24/2006 response, it appears that PN 6,818,484 B2 was inadvertently omitted.

Is noted that the amendments to the claims removed (or modified) many of the previous 112 rejections, such as deletion of "grain boundary free" in the preamble of claim 1 removed the contradiction created in claim 3, from which a majority of the subsequent claims depend, that requires the presence of grain boundaries.

2. Claims 1-21, 23 & 25-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In independent claim 1, while the amendment to the claim significantly clarifies the broadest process claimed, the amended phrase "... is exposed to a series of 2-shot laser irradiation steps in orthogonal directions" is ambiguous in that it is uncertain whether the orthogonal directions applies to the series of steps or to the two shots of the laser within the individual steps. Note this rejection would only apply to claim 1, as claim 2 defines the use of a first direction & a second direction orthogonal to the first, however is uncertain how the two steps of the first laser beam through the first aperture in the first direction relates to the two shots of the laser beam. Do the "two steps" in claim 2 represent the two shots of the laser, or do they represent 2 steps in the series, which would mean that the laser beam is being applied for 4 shots in the first direction, then in 4 shots in the second orthogonal directions, since (2 shots) X (2 steps) = 4, or does it mean something else altogether? These ambiguities need to be clarified for the

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examiner to make a meaningful of evaluation of the sequence of application of laser shots. It is noted that applicant did not cite support in the specification for the changes, which might have enabled the examiner to better determine applicant's intent.

Claim 2 has also been amended by the addition in the last two lines of the limitation "repeating a sequence of two-shot orthogonal laser irradiation is N number of times", but the relationship between "a sequence" and "the series" previously introduced is not clear. Does "a sequence" equal "a series", as both occur N number of times, or does "a sequence" = "two steps" = 2-shots, and thus described individual orthogonal steps in the series, or does "a sequence..." refer to the two preceding two-step procedure is using the first laser beam, or what? Clear relationships between terms used to describe different parts of the process, is recommended. {Also note with respect to breath of the claim (i.e. not a 112 issue *per se*), that as presently written in claim 2 the "two steps" could refer to numerous different actions not just shots of the laser irradiation, but could refer to positioning steps of the laser or aperture or substrate, or could refer to adjustment of some parameter, or something else with respect to the first laser beam not hinted at yet in the claims, or some combination thereof.}

Claim 10 uses the terminology "odd and even iteration...", but this language which is related to language previously employed in claim 2, which has now been deleted therefrom has no clear relationship to the series and/or sequences of 2-shot orthogonal laser irradiation.

In claim 11, line 4, is the new limitation of "a second area with a top surface" different from the limitation introduced in claim 1, line 8 directed to "a second area, included in the first area", or are these two introductions of "a second area" intended to represent the same area? Note that since the second occurrence was introduced with the article "a" it has **no antecedent basis** from the first introduced term, especially considering each limitation has different description attached thereto, such that it is unclear if they are intended to be the same limitation & as presently written, it is definitely **not necessary** for them to be the same. Note that consequently in the last line of claim 11 & in references in subsequent claims, it

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can be considered unclear which "second area" is being referred to by "the second area", however this nomenclature without the additional description tends to indicate the applicant did not intend to create two potentially different second areas.

Claim 14 which depends from claim 13 has been amended, however the clarification therein creates a contradiction of claim 13, as one of the requirements of claim 13 is that the "first pair of sides" be "located between first plural grain boundaries", however claim 14 requires "co-locating at least one pair side on a first plural grain boundary" (emphasis added), which would appear to be impossible, since "between" excludes "on", i.e. a parallel configuration that is between lines or sides of another configuration is totally inside the bounds of that other configuration. Did applicant make claim 13 more restricted than was their intent by not accurately considering the scope of "between"? Note analogous problems in claims 16 & 17.

While not a 112 problem *per se*, applicants may wish to note that in claims 19-21 & 23 only "first and second aperture patterns" & "a first laser beam" relate to any process steps employed in the preceding claims from which 19 depends, such that the claim limitations of lines 5-7 directed to "a second laser beam through a third aperture pattern" is irrelevant to the claim process, as it is not ever used for anything in the process (i.e. can be read on by anyone anywhere putting the claimed laser beam through an aperture). Did applicants perhaps intend a different dependence, such as perhaps claim 11, which would make the second set of limitations relevant?

In claim 25, how does the claimed "annealing..." limitation relate to the limitation in the independent claims where the second area, which is part of the first area is annealed via directional solidification (DS)? It remains unclear if these processes are intended to be related, but as presently written it appears that either the projection of the third laser beam or the annealing limitations of claim 25 could read on the DS process of claim 1, or the DS process could be a totally different limitation than either of these limitations introduced in claim 25. It is also uncertain in claim 25 what significant the

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recitation of first & second energy densities has to do with the claim that annealing, as any laser being employed will have an energy density. As the "exposing..." & "projecting..." steps of claim 25 are not related to any specific actions of the preceding claims 1-3, except that they occur in the first area and the former employees the previously claimed first laser beam, hence somehow overlaps with preceding described limitations, but the third laser beam may or may not be the first laser beam that was previously introduced, or may or may not be related to the DS process, or may be related to some totally unspecified other laser application in the same area. It is noted that given the amendment of claim 25 to be describing the "2N-shot laser irradiation process", that for the annealing of claim 25 to be the same as the annealing of the DS process, would mean that the DS process annealing is performed via a the "2N-shot laser irradiation process" and as part of that process, which does not appear to be necessarily excluded by the claim language in claim 1, as there is no temporal or antecedent language in the preceding claims excluding that possibility.

Claim 28 encompasses issues analogous to those of claim 25. Claims 32 & 35 have some similar issues, except that they specifically depend from claim 11, which is directed to the DS process to anneal the second area, which has been clarified to be subsequent to the formation of the polycrystalline silicon, such that the annealing referred to in these processes can clearly be said to be the anneal of the independent claim 1 & different from forming the polycrystalline silicon.

In claim 39, line 7, the limitation "the film overlying the diffusion barrier" has inconsistent nomenclature with any previously introduced film, hence lacks clarity and proper antecedent basis. Given the context, the examiner might guess that "the film overlying the diffusion barrier" is the film of amorphous silicon, however as claimed while that might be the case is not necessarily the case, as the associating limitation is open ended. Are lines 6-7 even necessary, since "the first area" gives antecedences to claim 1 and the formation of the "film of amorphous silicon" therein? It is noted that applicants' comments on page 19 of their response are narrower with the breath in which they amended

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this claim, but that the "subsequent..." limitations added in claims 39 & 11 sufficiently clarified the relationship of the steps forming the transistor features which had been previously unclear.

Also in claim 39, is the limitation of "forming in the first area, source and drain regions adjacent to, and interposing the channel region;" phrased as intended, as it is a bit awkward and whether there is a relationship from the previously introduced "a transistor channel" and at the "the channel region" of this phrase is unclear to the examiner? Both limitations are recited in the step of "forming a gate..." but the examiner is uncertain how they relate to each other, or if they necessarily do or should.

3. Claims 1-21, 23 & 25-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Due that to the multiplicity of uncertain options, especially as with respect to claims 1-2 as set forth above, possible options encompassed by the new claim language would appear to include options not particularly specified by the original claims nor by the original specification, especially considering that applicants merely recited that they clarified the claim language, but provided no citations of support in the jumbo specification. While the examiner suspects that the multiplicity of ambiguous options were not intended by the applicants, they are presently in the claims creating new matter issues unless they are removed or clear support for all possible options can be shown.

4. The disclosure is objected to because of the following informalities: applicants have amended the paragraph starting on page 6, line 10, so as to indicate that the steps mentioned in the beginning of the paragraph are in sequential order in figure 4, thus indicating that each alphabetical designation (a) through (i) represents a step, however the definition of N=2 at the beginning of the paragraph would appear to be indicating that there are only two steps (if N is as defined in independent claim 1), which is completely inconsistent with a figure which appears to show 8 steps plus an initial

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untreated substrate. This does not provide any reasonable clarification to the specification. Applicant's explanation on page 20 of their response bears little resemblance to the disclosure in the specification, such that the examiner finds it difficult to believe that anyone would interpret figure 4 as described their based on the paragraph on page 6, especially as amended, nor does the examiner see indications that one could insert the language in the remarks into the specification without creating new matter unless some other showing of our rationale for support can be provided. There seems to be a problem with consistently using meanings of terms in the claims, the specification & the response/remarks, creating a great deal of confusion. Since the individual parts of each alphabetically labeled section of figure 4 were never designated or particularly described in the original specification, and accurate meaning for each cannot be unambiguously determined, however cobbling together information from figure 4, the specification & applicants' p.20 explanation, it appears that 4(b) & 4(c) might represent first and second laser shots to the same location, and that 4(d) & 4(e) might represent a second set of first and second laser shots to an adjacent location in the same direction, then 4(f) & 4(g) might represent a third set of first and second laser shots in an orthogonal direction, with 4(h) & 4(i) possibly representing a fourth set of first and second laser shots to an adjacent location in the orthogonal direction. However, the examiner notes that such an interpretation does not appear to be consistent with the language as it is used in independent claim 1, nor does it appear to be consistent with the description on page 6, which would require the shots illustrated in 4(d) & 4(e) to be rotated 90° with respect to the preceding two shots.

Appropriate correction is required.

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

6. Claim 1 remains rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 & 7 of U.S. Patent No. 6,818,484 B2 (Voutsas). Although the conflicting claims are not identical, they are not patentably distinct from each other, because while having different scopes and orders of claiming various limitations, this Voutsas patent has laser treatment of amorphous silicon films or surfaces, where pulsed lasers are employed, including multiple pulses applied sequentially, and where some form of directional solidification (represented by the term lateral crystallization process) occurs in a process that may be called annealing, hence while generally more detailed than the present claim 1, this patent's claims encompass the present claim 1 except for the

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requirement of orthogonal directions. As was previously noted, applicant's claim 1 relates the laser irradiation process to being preformed in "a first area" and the SD annealing is being done in a "second area", this second area is either enclosed by or the same as the first area, and from the claim language there is no necessity that the laser irradiation and the anneal are necessarily different processes, such that one could be employing the laser irradiation to cause the directional solidification. Also the claimed "a film of amorphous silicon", while encompassing such a film formed on a substrate, also encompasses a freestanding film, i.e. at amorphous silicon substrate. The differences, such as order of claiming, or more detailed further limitations, are considered obvious variations on the general theme of laser irradiation to make a polycrystalline silicon surface. With respect to direction of the series of laser pulses, as noted above it is unclear how orthogonal relates to the series or the "2-shot" limitations, however claim 7 requires that the laser beam be advanced over the surface for the successive pulses, but does not specify the direction of the advance, hence is inclusive of the same or orthogonal directions of advance, and it would've been obvious to one of ordinary skill in the art to select direction of advance dependent on shape of area required to be affected by the lateral crystallization annealing process, which would have been expected depending on design requirements, such as the width & breath of the region to be crystallized.

7. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sposili et al. (6,577,380 B1), discussed in section 24 of the action mailed 9/19/2006.

The claims as written are too unclear to actually determine a clear sequence of limitations, however the previous discussion of Sposili et al. (380), which is inclusive of rotating or translating mask positions for sequential laser irradiation processes, hence for reasons as previously discussed is consistent with possibilities included by applicants broad & ambiguous claims. With respect to the amendment to the independent claims which requires some kind of use of orthogonal directions, that while generic rotation is not necessarily on the orthogonal, it is a typical in conventional procedure to rotate a mask 90°

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so as to optimize area coverage, since none perpendicular directions would provide less consistent area coverage.

Claims 11-21, 23, 25-~~46~~⁴⁴ are rejected under 35 U.S.C. 103(a) as being unpatentable over Sposili et al. (380) as applied to claims 1-10 above, and further in view of Yamazaki et al. (5894137), plus Fukunaga et al. (2004/0142543 A1) or Kawasaki et al. (6653657 B2) as discussed in sections 21-22 & 25 of the action mailed 9/19/2006.

8. Applicant's arguments filed 11/24/2006, and discussed above have been fully considered but they are not persuasive.

The previously applied art rejections are not discussed in more detail or not repeated, because the claims are too unclear as to exactly what is being claimed to make any reasonable application of relevant prior art that is not a waste of time due to the uncertainty of meaning, however when the claims have been sufficiently clarified for meaningful comparison with prior art, further reconsideration will be required.

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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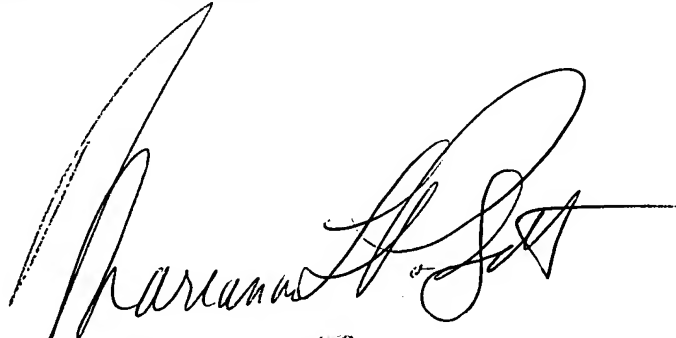
10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software

2/27/2007



MARIANNE PADGETT
PRIMARY EXAMINER